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AMTHOR, J.S. Lawrence Livermore National Laboratory, Livermore, CA 94551 USA. Interannual variation in leaf phenology and its impact on hydrology of a temperate deciduous forest ecosystem.

In cooperation with the Walker Branch Watershed (WBW) Throughfall Displacement Experiment, I am testing a process-based model of temperate deciduous forest ecosystem growth, hydrology, and forest-atmosphere exchanges of mass and energy. In the model, spring bud burst and leaf growth are affected by photoperiod and winter and spring temperatures, including a chilling requirement. Autumnal leaf senescence and death is regulated by photoperiod and temperature. For the period 1992-1996, interannual variability in weather results in modeled year-to-year differences in the duration of functional leaf display of up to 10 days. This is consistent with observations in WBW, although some discrepancies between the model and reality exist. I investigated effects of interannual variability in leaf display on seasonal and annual ecosystem hydrology. In spring, changes in leaf phenology can have large impacts on evapotranspiration through changes in transpiration and canopy interception of rain. Effects on canopy interception are affected by rain timing. Early autumnal frost can alter autumnal transpiration and canopy interception. In the model, effects of altered leaf phenology have only small impacts on annual evapotranspiration, however, in part because water savings in spring tend to be consumed somewhat later in the year by additional root water uptake.

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